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EXAMINER

NGUYEN, TAM M

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



## **DETAILED ACTION**

### ***Response to Amendment***

The rejection of 1, 3, 5, 10, 13, 14-17, 21 and 22 are rejected under 35 U.S.C. 102(e) as anticipated by Sanfilippo et al. (US 2005/0177016 A1) is withdrawn by the examiner in view of the amendment filed on February 5, 2010.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

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the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3, 5, 10, 13, 14-16, 21 and 22 are rejected under 35 U.S.C. 103(a) as obvious over Sanfilippo et al. (US 2005/0177016 A1) in view of admitted prior art and either Ruottu et al. (US 6,045,688) or Gartside et al. (US 5,254,788).

Sanfilippo discloses a process of producing a vinyl aromatic compound such as styrene by contacting a C<sub>2-5</sub> alkyl-substituted aromatic compound (e.g., ethylbenzene) in a dehydrogenation catalyst in a reaction zone to produce a hydrocarbon product comprising a C<sub>2-5</sub> alkenyl-substitute aromatic (e.g., styrene). The spending catalyst is then separated from the hydrocarbon product and passed into regeneration zone and combined with fresh catalyst and returned to the dehydrogenation reaction zone. Styrene is then recovered as a product. The dehydrogenation reaction zone is operated at a temperature of from 400° C to about 750° C, at a pressure of slightly higher atmospheric, at a GHSV higher than 2000 NI/hl<sub>cat</sub>, and residence times of the solid (catalyst) of less than 1 minutes. The dehydrogenation comprises an alkaline, manganese, gallium, and platinum deposited on alumina. The feed is introduced to the dehydrogenation reactor at multiple points of entry with an inert carrier gases. (See abstract; Figs. 1-2; paragraphs [0009], [0014], [0015], [0025], [0026]; claims 15 and 18).

Since the process of Sanfilippo is operated at a GHSV higher than 2000 NI/hl<sub>cat</sub> and residence times of the solid (catalyst) of less than 1 minute, it would be expected that the residence times of hydrocarbon and catalyst in the dehydrogenation riser and the separator would encompass the residence times as claimed.

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Alternatively,

Ruottu discloses a dehydrogenation reactor wherein the residence time in the dehydrogenation riser reactor is in the range of 0.4 to 0.5 seconds and gas residence time in the separator (e.g., cyclone) is about 1 to 2 seconds. This means that the total contact time of the catalyst in the reaction zone and in the separator would be about 1.4 to 2.5 seconds. Ruottu further teaches that the dehydrogenation riser is operated at a temperature of from 100 to 1300° C (See abstract; col. 3, line 15 through col. 4, line 13; col. 4 lines 45-50; col. 8, lines 7-9).

Gartside teaches a dehydrogenation process wherein the dehydrogenation reaction zone is operated at temperature of from 900 to 1600° F (482 to 871° C) and at a pressure of from 10 to about 100 psig. The residence time of the light paraffins in the reaction zone is from about 0.1 to about 2 seconds. Gartside further discloses that the catalyst spends about 0.1 to about 2 seconds from passage through the rectangular orifice to discharge from the separator outlet. This means that the total contact time of the catalyst in the reaction zone and separator is about 0.1 to about 2 seconds. The feed is introduced to the dehydrogenation reactor at multiple points of entry. (See abstract; Figures 2-4; col. 4, lines 5-60; col. 7, lines 24-27; col. 10, lines 42-50; col. 12, lines 35-43; col. 12, line 54 through col. 13, line 3; col. 16, lines 45-56; Tables 2-4)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Sanfilippo by utilizing the dehydrogenation reactor of either Ruottu or Gartside because such reactor has a high efficiency.

Sanfilippo does not specifically teach that the regenerator is a fluid bed catalyst regenerator.

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Admitted prior art teaches a fluid bed catalyst regenerator. See page 8, line 26 of the present specification.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Sanfilippo by utilizing a regenerator as suggested admitted prior art because such regenerator is known to be effective.

### ***Response to Arguments***

The argument that Sanfilippo does not teach a regenerator as claimed is not persuasive because of a rejection above.

The argument that Sanfilippo criticizes the prior art process depicted in US 6,031,143 as using a system consisting of a reactor and a fluid bed regenerator is not persuasive. One of ordinary skill in the art is "also a person of ordinary creativity, not an automaton." *KSR*, 550 U.S. at 421. Certainly, skill in the art is presumed and that one of ordinary skill in the art would have found it obvious to weigh the advantages and disadvantages of using various known regenerators given the combined teachings of the applied prior art, and accordingly optimize to regenerate the spent catalyst. *See, Ex parte Obiaya*, 227 USPQ58, 60 (BPAI 1985) (holding that the recognition of a result flowing naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise have been obvious). The test for obviousness is what the teachings and disclosures of the prior art would have suggested to one of ordinary skill in the art, even including unpreferred embodiments. *See In re Lamberti*, 545 F.2d 747, 750, 192 USPQ 278, 280 (CCPA 1976). Also it appears that the regenerator of Sanfilippo is similar to the regenerator of US 3,88,762.

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### **Declaration**

The declaration filed on 2/5/2010 have been fully considered but they are not persuasive because the combination teachings of Sanfilippo and the admitted prior would arrive a regenerated catalyst as claimed because of the similarities between the claimed regenerator and the regenerator of the admitted prior.

### **Conclusion**

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TAM M. NGUYEN whose telephone number is (571)272-1452. The examiner can normally be reached on Monday through Thursday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TN

/Tam M. Nguyen/

Primary Examiner, Art Unit 1797